

AMENDMENTS TO THE CLAIMS

Claims 1-3 (Cancelled)

4. (Previously Presented) The imager of claim 5 wherein the second semiconductor region includes silicon.

5. (Previously Presented) An imager comprising:
a first region of semiconductor material, the first region of semiconductor material having a first conductivity type, the first semiconductor region being free of germanium;

a second region of semiconductor material located on the first region of semiconductor material, the second region of semiconductor material having a second conductivity type, the second semiconductor region being free of germanium; and

a third region of semiconductor material located on the second region of semiconductor material, the third region of semiconductor material including silicon and germanium and having the second conductivity type.

6. (Original) The imager of claim 5 wherein the first and second semiconductor regions include silicon.

7. (Previously Presented) An imager comprising:
a first region of semiconductor material, the first region of semiconductor material having a first conductivity type;

a second region of semiconductor material located on the first region of semiconductor material, the second region of semiconductor material having a second conductivity type;

a third region of semiconductor material located on the second region of semiconductor material, the third region of semiconductor material including silicon and germanium and having the second conductivity type; and

a fourth region of semiconductor material located on the third region of semiconductor material, the fourth region of semiconductor material having the second conductivity type and being free of germanium.

8. (Original) The imager of claim 7 wherein the second semiconductor region is free of germanium.

9. (Original) The imager of claim 8 wherein the second and fourth regions of semiconductor material include silicon.

10. (Original) The imager of claim 7 wherein the fourth region of semiconductor material has a greater dopant concentration than the second region of semiconductor material.

11. (Previously Presented) An imager comprising:
a first region of semiconductor material, the first region of semiconductor material having a first conductivity type;
a second region of semiconductor material located on the first region of semiconductor material, the second region of semiconductor material having a second conductivity type;
a third region of semiconductor material located on the second region of semiconductor material, the third region of semiconductor material including silicon and germanium and having the second conductivity type;

a fourth region of semiconductor material located on the third region of semiconductor material, the fourth region of semiconductor material having the second conductivity type and being free of germanium;

a fifth region of semiconductor material located on the fourth region of semiconductor material, the fifth region of semiconductor material having the first conductivity type;

a sixth region of semiconductor material located on the fifth region of semiconductor material, the fifth region of semiconductor material having the second conductivity type; and

a seventh region of semiconductor material located on the sixth region of semiconductor material, the seventh region of semiconductor material including silicon and germanium and having the second conductivity type.

12. (Original) The imager of claim 11 wherein the second and sixth semiconductor regions are free of germanium.

13. (Original) The imager of claim 12 wherein the second and sixth semiconductor regions include silicon.

14. (Original) The imager of claim 12 wherein the first and fifth semiconductor regions are free of germanium.

15. (Original) The imager of claim 14 wherein the first, second, fifth, and sixth semiconductor regions include silicon.

16. (Original) The imager of claim 11 and further comprising an eighth region of semiconductor material located on the seventh region of semiconductor

material, the eighth region of semiconductor material having the second conductivity type and being free of germanium.

17. (Cancelled)

18. (Previously Presented) A method of forming an imager, the method comprising the steps of:

forming a first region of semiconductor material, the first region of semiconductor material having a first conductivity type and being free of germanium; and

forming a second region of semiconductor material on the first region of semiconductor material, the second region of semiconductor material having a second conductivity type and being free of germanium; and

forming a third region of semiconductor material on the second region of semiconductor material, the third region of semiconductor material including silicon and germanium and having the second conductivity type.

19. (Previously Presented) The method of claim 18 wherein the second semiconductor region includes silicon.

20. (Previously Presented) The method of claim 18 and further comprising the step of forming a fourth region of semiconductor material on the third region of semiconductor material, the fourth region of semiconductor material having the second conductivity type and a greater dopant concentration than the third region, and being free of germanium.

21. (Previously Presented) The imager of claim 5 and further comprising:

a conductive region that contacts the first region of semiconductor material;
and

a first isolation region that contacts the second and third regions of semiconductor material and the conductive region to isolate the second and third regions of semiconductor material from the conductive region.

22. (Previously Presented) The imager of claim 21 and further comprising:

a plurality of layers of semiconductor material formed over the third region of semiconductor material, the plurality of layers of semiconductor material including a first layer having the first conductivity type and a second layer having the second conductivity type, the first layer contacting the conductive region;

a second isolation region that contacts the plurality of layers of semiconductor material and the conductive region to isolate layers with the second conductivity type from the conductive region.

23. (Previously Presented) The imager of claim 7 and further comprising:

a first plurality of layers of semiconductor material formed over the fourth region of semiconductor material, the plurality of layers of semiconductor material including a first layer having the first conductivity type and a second layer having the second conductivity type;

a conductive region that contacts the fourth region of semiconductor material;
and

an isolation region that contacts the first plurality of layers of semiconductor material and the conductive region to isolate the first plurality of layers of semiconductor material from the conductive region.

24. (Previously Presented) The imager of claim 23 and further comprising a second plurality of layers of semiconductor material formed over the first plurality of layers of semiconductor material, the second plurality of layers of semiconductor material including a first layer having the first conductivity type and a second layer having the second conductivity type, the isolation region isolating the conductive region from the second plurality of layers of semiconductor material.

25. (New) An imager formed in a semiconductor material, the imager comprising:

a first region of the semiconductor material, the first region contacting a top surface of the semiconductor material, being a first conductivity type, and having a layer that includes silicon germanium; and

a second region of the semiconductor material located below the first region, the second region contacting the first region and being a second conductivity type.

26. (New) The imager of claim 25 wherein the first region has a layer that is free of germanium, and the second region is free of germanium.

27. (New) The imager of claim 25 and further comprising:

a third region of the semiconductor material located below the second region, the third region being a first conductivity type, and having a layer that includes silicon germanium and a layer that is free of germanium;

a fourth region of the semiconductor material located below the third region, the fourth region of semiconductor material contacting the third region and being the second conductivity type.

28. (New) The imager of claim 27 wherein the fourth region is free of germanium.

29. (New) The imager of claim 27 and further comprising:
a fifth region of the semiconductor material located below the fourth region, the fifth region being a first conductivity type, and having a layer that includes silicon germanium and a layer that is free of germanium;
a sixth region of the semiconductor material located below the fifth region, the sixth region of semiconductor material being the second conductivity type.

30. (New) The imager of claim 29 wherein the fourth region is free of germanium.

31. (New) The imager of claim 25 wherein the first region includes:
a first silicon layer that is free of germanium;
a silicon germanium layer that contacts the first silicon layer; and
a second silicon layer that is free of germanium and spaced apart from the first silicon layer, the second silicon layer contacting the silicon germanium layer.

32. (New) The imager of claim 31 wherein the second silicon layer contacts the second region.

33. (New) The imager of claim 27 wherein:
the first region includes:

a first silicon layer that is free of germanium;
a first silicon germanium layer that contacts the first silicon layer; and
a second silicon layer that is free of germanium and spaced apart from the first silicon layer, the second silicon layer contacting the first silicon germanium layer, and

the third region includes:

a third silicon layer that is free of germanium;
a second silicon germanium layer that contacts the third silicon layer;
and

a fourth silicon layer that is free of germanium and spaced apart from the third silicon layer, the fourth silicon layer contacting the second silicon germanium layer

34. (New) The imager of claim 33 wherein the second silicon layer contacts the second region and the fourth silicon layer contacts the fourth region.